Paper No. 17

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte VIKTOR D. VOGMAN

Appeal No. 2001-1627
Application No. 09/289,420

ON BRIEF

Before FLEMING, DIXON, and LEVY, *Administrative Patent Judges*.

LEVY, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1-31, which are all of the claims pending in this application.

BACKGROUND

Appellant's invention relates to a DC-DC voltage converter. An understanding of the invention can be derived from a reading of exemplary claim 1, which is reproduced as follows:

1. A DC-to-DC converter having an input voltage and an output voltage, comprising:

a circuit topology such that, in operation, the input and output voltages have the same polarity, and that a magnitude of a ratio of the input voltage to the output voltage of said DC-to-DC converter is capable of being equal to, greater than, or less than one;

said circuit topology being further such that at least one capacitor and alternative coils of a two-coil inductor are employed in a primary and a secondary circuit loop of said DC-to-DC converter;

said primary and secondary circuit loops not being electrically isolated.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Cuk et al. (Cuk)	4,274,133	June 16, 1981
Bang	5,621,625	Apr. 15, 1997
Yasumura	5,835,368	Nov. 10, 1998

Claims 1-31 stand rejected under 35 U.S.C. § 102(e) as being clearly anticipated by Yasumura.

Claims 1-25 stand rejected under 35 U.S.C. § 102(b) as being clearly anticipated by Cuk.

Claims 1-31 stand rejected under 35 U.S.C. § 102(b) as being clearly anticipated by Bang.

Rather than reiterate the conflicting viewpoints advanced by the examiner and appellant regarding the above-noted rejections, we make reference to the examiner's answer (Paper No. 13, mailed November 21, 2000) and the final rejection (Paper No. 7, mailed March 28, 2000) for the examiner's complete reasoning in support of the rejections, and to appellant's brief (Paper No. 12, filed December 4, 2000) and reply brief (Paper No. 14, filed January 24, 2001) for appellant's arguments thereagainst. Only those arguments actually made by appellant have been considered in this decision. Arguments which appellant could have made but chose not to make in the brief have not been considered. See 37 CFR 1.192(a).

OPINION

In reaching our decision in this appeal, we have carefully considered the subject matter on appeal, the rejections advanced by the examiner, and the evidence of anticipation relied upon by the examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, appellant's arguments set forth in the briefs along with the examiner's rationale in support of the rejections and arguments in rebuttal set forth in the examiner's answer.

Upon consideration of the record before us, we affirm-in-part.

We begin with the rejection of claims 1-25 under 35 U.S.C. § 102(e) as being clearly anticipated by Cuk. The examiner's rejection, in its entirety (final rejection, page 3) is that "Cuk et al. disclose DC to DC converter having reduced ripple without need for adjustment in figures 1-5." To anticipate a claim, a prior art reference must disclose every limitation of the claimed invention, either explicitly or inherently. In re Schreiber, 128 F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997). As stated in In re Oelrich, 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981) (quoting Hansgirg v. Kemmer, 102 F.2d 212, 214, 40 USPQ 665, 667 (CCPA 1939)) (internal citations omitted):

> Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.

Appellant asserts (brief, page 14) that claims 1-25 are not met by Cuk for the reasons set forth in the brief with respect to Yasumura, and adds that Cuk does not expressly or inherently meet limitations directed to non-electrically isolated primary and secondary circuit loops; nor to an input and output voltage having the same polarity. It is argued (brief, page 8) that the claim 1 limitation directed to the use of an inductor in contrast to a magnetically coupled transformer is not met. The issue is whether a transformer meets the claimed two-coil inductor. The examiner's position (final rejection, page 4) is that appellants primary and secondary windings form a transformer, and that since the references each include a transformer, the claimed "two-coil inductor" is met. The examiner (answer, page 4) relies upon a dictionary[1] definition of a transformer to support his position.

Appellant responds (reply brief, pages 3 and 4) by citing a different dictionary[2] definition of a transformer to support appellants position that a transformer requires a ferromagnetic core, whereas an inductor may or may not have a ferromagnetic core. Appellant asserts (id.) that because an inductor do not necessarily have a ferromagnetic core, that the transformers of the prior art are not equivalent to the claimed two-coil inductor.

We find that appellant's specification (page 4) discloses inductor 160 to have a core. However, the specification is not specific as to whether the core is a ferromagnetic core or an air

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[1] McGraw-Hill Electronics Dictionary, Fifth Edition, 1994.

[2] The Illustrated Dictionary of Electronics, 4th Edition, 1988.

core. In any event, the specification (page 5) discloses that the embodiment of the invention does not employ a transformer, and that (page 6) a less expensive component such as inductor 160 may be used instead of a transformer. However, we need not decide the issue of whether inductor 160 is in fact a transformer because claim 1 neither claims nor precludes a transformer. The claim requires a two-coiled conductor. Cuk discloses a transformer T which includes two coiled inductors L_1 and L_2. From the use of the transitional phrase "comprising", we consider the claim to be open-ended, and find no language in claim 1 which would preclude a transformer. Accordingly, because the transformer of Cuk includes two inductor coils, we find that Cuk meets the claimed two-coiled inductor.

Appellant further asserts (brief, page) that the recitation of a ratio of the input voltage to the output voltage is capable of being equal to, greater than, or less than one, is not met. The examiner's position (answer, page 5) is that the claim language does not constitute a limitation in a patentable sense, but only requires the ability to perform. The examiner adds that assuming *arguendo* that the language was considered to be a limitation in a patentable sense, that the limitation is met because for any converter, the ratio of the output to the input voltage is equal to, less than or greater than one. We find the claim language to be a broad recitation of structure, and that to meet the limitation, Cuk would have to be capable of meeting the claimed ratio. We find that the language of the claim "equal to, greater than, or less than one" is broad enough to read on the entire set of real numbers, and that whatever the voltage ratio is, it will inherently be in the ratio of "equal to, greater than, or less than one." Accordingly, we consider this limitation to be met by Cuk.

Appellant further argues (brief, page 11) that the limitation regarding the recited alternative coils of a two-coil inductor being employed in a primary and secondary loop, is not met by the prior art. We note that the claim language does not require that <u>both</u> coils are in <u>each</u> loop, but rather that one of the alternative coils in one of the primary and secondary loops and that the other coil is in the other of the primary and secondary loops, as is shown for example in figure 3a of Cuk. In any event, to the extent that claim 1 could be construed as requiring that both coils are in each loop, we find this to be me by virtue of switch S, which along with capacitor C1 connects both loops or circuits. It is further argued (brief, pages 14 and 15) that the limitation regarding non-electrically isolated primary and secondary circuit loops is not met.

Appellant asserts (brief, page 15) that figure 3a of Cuk is illustrative of appellant's position that the primary and secondary circuit loops of Cuk are electrically isolated by C1, Le, C2 and Vg, and that these circuits would prevent electrical charge from flowing from L1 to L2. We find that Cuk discloses (col. 2, lines 55-58) that "Fig. 6 illustrates one possible realization of the present invention for a coupled-inductor converter with dc isolation between the input (source) circuit and multiple output (load) circuits." Cuk additionally discloses that "[b]ecause the coupled-inductor configurations of Fig. 1 and Fig. 7 do not have the isolation property of the configuration of Fig. 6 . . .."

We find from the disclosure of Cuk that in the embodiment of figure 6, the primary and secondary circuit loops are electrically isolated, but that in the embodiments of figures 1 and 7, the primary and secondary circuit loops are not electrically isolated. Accordingly, we find this limitation of claim 1 to be met by Cuk.

Appellant further argues (brief, page 16) that the recitation in claim 1 that "the input and output voltages have the same polarity" is not met by Cuk as shown by the + and - signs in the figures. The examiner asserts (answer, page 5) that "all three reference have a positive voltage input and a positive voltage output anticipating appellants claims."

From our review of Cuk, we agree with appellant that Cuk discloses opposite polarity at the output of the converter than the voltage at the input to the converter; see e.g., figure 7. Accordingly, from all of the above, we find that Cuk does not meet all of the limitations of claim 1. Accordingly, the rejection of claim 1, and claims 2-18 dependent therefrom, under 35 U.S.C. § 102(b) is reversed. As independent claim 19 similarly requires that the input and output voltages have the same polarity, the rejection of claim 19 and claims 20-25, dependent therefrom, is reversed.

We turn next to the rejection of claims 1-31 under 35 U.S.C. § 102(b) as being clearly anticipated by Bang. The examiner's rejection, in its entirety (final rejection, page 3) is that "Bang discloses a surge protection circuit for a switching mode power supply in figure 3." Appellant asserts (brief, pages 17 and 18) that Bang does not meet the claim limitations directed to electrically isolated circuit loops; the use of an inductor in contrast to a power supply transformer, nor to an inductor included in both a primary and secondary circuit loop.

With respect to the use of an inductor, we make reference to our findings, supra, with respect to claim construction of claim 1 being broad enough to read on the two coils of an inductor that is part of a transformer, as shown in figure 3 of Bang.

With respect to the inductor being included in both a primary and secondary loop, as we found, supra, the language does not require that each of the coils are in both circuit loops, but rather reads on one coil of the inductor being in one circuit loop and the other coil being in the other circuit loop. Accordingly, we find two coil transformer T1 of Bang to meet this limitation of claim 1. With regard to the limitation regarding the non-electrical isolation of the primary and secondary circuit loops, The examiner's position (final rejection, page 4) is that "[f]rom applicant figure 1 it is clear that the capacitor is the element that doesn't electrically isolated [sic] the two windings. For the same reason the Yasumura and Bang references are also not electrically isolated." The examiner additionally asserts (answer, page 5) that "transformers are generally electrically isolated. However, with applicants claimed capacitor connection between the primary and secondary winding, the transformer was not electrically. Notwithstanding isolation, all three of the cited prior art references show a capacitor connected between the primary and secondary windings." We construe the examiner's position to be that transformers are generally isolated, but that because the presence of appellant's capacitor causes the windings to be considered as non-isolated, that therefore, notwithstanding isolation, the prior art windings are not isolated because they have capacitors between the coils.

Appellant's position (brief, page 18) is that the primary and secondary circuit loops of Bang are electrically isolated. It is argued that capacitors C1 and C2 are employed in the circuit for surge suppression, and not to electrically couple the primary and secondary circuit loops. Appellant adds (id.) that "Capacitors are commonly employed to isolate circuit elements and, for example, to suppress electrical surges. Therefore, the presence of a capacitor, or capacitors, cannot meet this aspect of claim 1." Appellant additionally asserts (reply brief, page 5) that the lack of electrical isolation between primary and secondary circuit loops is achieved, for example, by a switching element, such as transistor 110.

From our review of Bang, we find that capacitors C1 and C2 snub bidirectional surge coupled between the drain terminal of Q1 and the anode of diode D1 in snubber circuit 20, which absorbs the peak value of the current surge (col. 2-9, 22-25, and 31-38). We additionally find that the capacitors provide surge protection, as advanced by appellant, and do not provide non-isolation of the circuit loops. We agree with appellant that Bang does not disclose non-isolation of the circuit loops, and therefore find that Bang does not anticipate claim 1. Accordingly, the rejection of claim 1, and claims 2-18 dependent therefrom, under 35 U.S.C. § 102(b) is reversed. As independent claim 19 also requires that the primary and secondary loop circuit are not electrically isolated, the rejection of claim 19, and claims 20-25, dependent therefrom under 35 U.S.C. § 102(b) is reversed.

We turn next to the rejection of independent claim 26. We observe that claim 26 is the broadest of the three independent claims. We make reference to our findings, supra, with respect to the teaching of Bang. In addition, we find from figure 3 of Bang that the polarity of the output voltage B^+1 and B^+2 is the same relative polarity as the output voltage of voltage doubler 10. Although appellant asserts (reply brief, page 6) that all of the cited patents have output voltages that are of opposite relative polarity to their input voltages, appellant does not point to any portion of the disclosure of Bang to support appellant's position. Thus, from all of the above, we find nothing in the disclosure of Bang that would convince us of any error in the examiner's position that the output and input voltages of Bang have the same polarity. With respect to the limitation of "an inductor included in both circuit loops," appellant asserts (brief, pages 18 and 19) that in appellant's invention, coupled coils 162 and 164 are in both circuit loops due to the presence of transistor 11. However, as we found, supra, claim 26 is broad enough to read on one coil of the inductor being in one loop and the other coil of the inductor being in the other loop. We find this interpretation to be consistent with the language of claim 27, dependent from claim 26, which recites that "wherein said conductor comprises a two-coil conductor, one of said coils being in said primary loop and one of said coils being in said secondary loop." Because claim 26 is broad enough to read on one of the coils being in each of the loops, we find that this limitation is met by Bang.

In addition, due to the inherent nature of the transformer T1 of Bang, we find that an input voltage is across the inductor while the transformer charges and that an output voltage is across the inductor when the transformer discharges. Moreover, in view of the inherent nature of the duty cycle generated by switching driver 60 for at the gate of switching transformer Q1 (col. 4, lines 25-34) of Bang, we find that the primary and secondary circuit loops conduct at different times.

From all of the above, we find that Bang anticipates claim 26. Accordingly, the rejection of claim 26 under 35 U.S.C. § 102 (b) is affirmed. As claims 27-31 fall with claim 26 (brief, page 8), the rejection of claims 27-31 under 35 U.S.C. § 102(b) is affirmed.

We turn next to the rejection of claims 1-31 under 35 U.S.C. § 102(e) as being clearly anticipated by Yasumura. We begin with claim 1. Appellant asserts (brief, page 11) that Yasumura does not meet the recited claim limitation directed to the use of an inductor in contrast to a transformer. We make reference to our construction of claim 1, supra. We find that the primary coil N_1 and secondary coil N_i of MCT meet the claimed "two-coil inductor" based upon our determinations, supra, with respect to the construction of claim 1. Appellants argue (id.) that Yasumura does not meet the claimed "input voltage ratio to output voltage ratio capable of being equal to, greater than, or less than one." The voltage ratios of Yasumura inherently meet this limitation because whatever the ratio is, it is inherently within the set of numbers defined by greater than one, equal to one or less than one.

Appellant further argues that Yasumura does not meet the claimed "alternative coils of a two-coil inductor are employed in a primary and secondary circuit loop." We find that this limitation is met by Yasumura based our findings, supra, with respect to claim construction of claim 1.

It is further argued that the limitation regarding the "input and output voltages having the same polarity" is not met. We find from the disclosure of Yasumura that secondary winding Ni of a magnetic coupling transformer MCT are interposed in series on the rectified output line between the positive terminal of a bridge rectifying circuit D_1 and that of smoothing condenser Ci (col. 5, lines 29-32). Yasumura further discloses that the polarity of the drive winding N_{B2} is opposite to that of drive winding N_{B1} to produce a voltage of reverse polarity (col. 6, lines 29-31). It is further disclosed that MCT transfers the alternating voltage of the switching frequency generated by the switching output to the secondary windings Ni through the magnetic coupling. In addition, since the secondary winding Ni is interposed on the positive output line from the bridge rectifying circuit D_1, the switching voltage transferred to the secondary winding is superimposed to the rectified output voltage on the rectifying path. Owing to the superimposition of the switching voltage, the high speed recovery type rectifying diode D_2 interposed on the rectifying path switches on and off the rectified current at the switching frequency (col.6, line 62 through col. 7, line 6). Moreover, Yasumura discloses (col. 7, lines 57-65)

> The voltage V_1 between the connection point of the high-speed recovery type rectifying diode D_2 and secondary winding Ni and the primary ground, which is equivalent to the voltage across the secondary winding Ni of the magnetic coupling transformer MCT, takes on a waveform that the alternating voltage of the switching

> frequency is superimposed on the rectified output voltage of the bridge rectifying circuit D_1, as shown in FIG. 2C.

From the disclosure of Yasumura that the positive terminal is the output of the rectifying bridge D_1; the showing of E_i in figure 2C having positive polarity, and the positive polarity shown in figure 1 at the input to the switching power circuit 1, we find that the input and output voltages of figure 1 of Yasumura are of the same polarity, as recited in claim 1.

It is further argued (reply brief, pages 5) that Yasumura does not meet the claimed limitation that "the primary and secondary circuit loops are not electrically isolated." From our agreement with appellant, supra, that a capacitor will tend to isolate, we agree with appellants (id.) that the capacitor C2 does not eliminate the isolation of the primary and secondary circuit loops. However, because the output of the switching voltage transferred to the secondary winding is superimposed on the rectified output voltage on the rectified path, we find that notwithstanding the presence of switching transistors Q_1 and Q_2, that there is no clear teaching in Yasumura of the primary and secondary circuits not being isolated, because Yasumura does not disclose current flow between secondary winding Ni and switching transistors Q_1 and Q_2. To find that Yasumura discloses non-isolated primary and secondary circuits, we would have to resort to speculation, which we decline to do. See In re Warner, 379 F.2d 1011, 1017, 154 USPQ 173, 178 (CCPA 1967). Accordingly, we find that the examiner has failed to establish a prima facie case of anticipation of claim 1. The rejection of claim 1, and claims 2-18, dependent therefrom, under 35 U.S.C. § 102(e) is therefore reversed.

We turn next to the rejection of claims 19-25. As independent claim 19 also recites that "wherein said primary loop and secondary loop circuits are not electrically isolated," the rejection of claim 19, and claims 20-25, dependent therefrom, under 35 U.S.C. § 102 (e) is reversed.

We turn next to independent claim 26. Claim 26 requires, inter alia, that current is conducted through a primary and secondary loop circuits at different times. The examiner has provided no indication of how this limitation is considered to be met by Yasumura. Appellant asserts (brief, page 13) that appellant, having reviewed Yasumura, is unable to determine how the document expressly or inherently meets this limitation.

We find that Yasumura discloses (col. 6, lines 45-47) that when the self-excited switching operation starts, the switching elements Q_1 and Q_2 go on alternatingly. In operation, the switching output is supplied to the primary winding N_1 and MCT transfers the alternating voltage of the of the switching frequency generated by the switching output to the secondary winding Ni through magnetic coupling (col. 6, lines 55-67). As shown in figure 3, a switching operation by the switching elements Q_1 and Q_2 is illustrated in the case of a switching frequency of 100 kHz. The switching elements Q_1 and Q_2 repeat ON/OFF operation alternatingly, and switching currents I_{C1}, I_{C2} running across each collector and emitter assume the waveforms shown in figures 3B and 3C, respectively. From the alternative operation of switching elements Q_1 and Q_2, and the alternating voltage generated by the switching output to the secondary winding, we find that the primary and secondary circuits of Yasumura conduct at the same time. From all of the above, we find that the examiner has failed to establish a prima facie case of anticipation of claim 26 by Yasumura. Accordingly, the rejection of claim 26, and claims 27-31 dependent therefrom, under 35 U.S.C. § 102(e) is reversed.

CONCLUSION

To summarize, the decision of the examiner to reject claims 1-31 under 35 U.S.C. § 102(e) as anticipated by Yasumura is reversed. The decision of the examiner to reject claims 1-25 under 35 U.S.C. § 102(b) as anticipated by Cuk is reversed. The decision of the examiner to reject claims 1-25 under 35 U.S.C. § 102(b) as anticipated by Bang is reversed. The decision of the examiner to reject claims 26-31 under 35 U.S.C. § 102(b) as anticipated by Bang is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED-IN-PART

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